

Claims

- [c1] 1. A drive train for a bicycle, comprising:
- (a) a housing assembly mounted at a lower middle junction of a bicycle frame, which has a pedal assembly journalled therein;
 - (b) a drive shaft fixably mounting a plurality of different diameter drive elements coaxially, said drive shaft having a drive shaft rotational axis and being journalled in and between a housing first end cover plate and a housing second end cover plate of said housing assembly, the pedal assembly rotationally coupled to said drive shaft, said drive elements having a generally conical envelope extending between said first end cover plate and said second end cover plate;
 - (c) a driven shaft journalled in and between said first end cover plate and said second end cover plate, said driven shaft having a driven shaft rotational axis positioned parallel to said drive shaft rotational axis, said driven shaft mounting a plurality of rotatably unfixed different diameter driven elements coaxially, said driven elements having a generally conical envelope extending between said first end cover plate and said second end cover plate, said driven shaft rotationally coupled to a bicycle rear wheel;
 - (d) a plurality of connection elements for rotationally coupling said plurality of different diameter drive elements to said plurality of different diameter driven elements such that a single connection element rotatably couples a single drive element to a single driven element that are in alignment; and
 - (e) a means for rotatably engaging a selected single driven element to said driven shaft to establish a selected rotational ratio between said drive shaft and said driven shaft.
- [c2] 2. A drive train for a bicycle according to claim 1 wherein said means for rotatably engaging is an axially slidable body in a void within said driven shaft movable to a selected axial position along said driven shaft rotational axis corresponding to engaging said selected single driven element, said selected axial position is accomplished by an axial linkage within said void that is adjacent to said body and extends beyond said driven shaft.
- [c3] 3. A drive train for a bicycle according to claim 2 wherein said driven shaft has a

plurality of apertures between said void and an outside diameter of said driven shaft.

- [c4] 4. A drive train for a bicycle according to claim 3 wherein said plurality of different diameter driven elements have a plurality of cavities located on an internal diameter of said plurality of different diameter driven elements such that at least one of said cavities align with at least one of said apertures when there is relative rotational movement between said driven shaft and said plurality of different diameter driven elements.
- [c5] 5. A drive train for a bicycle according to claim 4 wherein said body further comprises a finger that is biased to insert through an aperture of said driven shaft with said finger being received into a cavity of said selected single driven element for engaging said selected single driven element to said driven shaft when said aperture and said cavity are in alignment.
- [c6] 6. A drive train for a bicycle according to claim 5 wherein said finger is biased by a spring.
- [c7] 7. A drive train for a bicycle according to claim 5 wherein said body further comprises a plurality of fingers.
- [c8] 8. A drive train for a bicycle according to claim 7 wherein said plurality of fingers are biased by a plurality of springs.
- [c9] 9. A drive train for a bicycle according to claim 2 wherein said axial linkage is a direct acting control cable attached to a handlebar mounted selector on the bicycle wherein movement of said handlebar selector moves said direct acting cable resulting in axial movement of said body within said void.
- [c10] 10. A drive train for a bicycle according to claim 9 wherein said axial linkage further comprises a reverse acting control cable that is operable to move in an opposite direction from said direct acting control cable to axially pull said body axially bidirectionally within said void.
- [c11] 11. A drive train for a bicycle, comprising:
(a) a housing assembly mounted at a lower middle junction of a bicycle frame,

which has a pedal assembly journalled therein;

(b) a drive shaft fixably mounting a plurality of different diameter drive chain sprockets coaxially, said drive shaft having a drive shaft rotational axis and being journalled in and between a housing first end cover plate and a housing second end cover plate of said housing assembly, the pedal assembly rotationally coupled to said drive shaft, said drive chain sprockets having a generally conical envelope extending between said first end cover plate and said second end cover plate;

(c) a driven shaft journalled in and between said first end cover plate and said second end cover plate, said driven shaft having a driven shaft rotational axis positioned parallel to said drive shaft rotational axis, said driven shaft mounting a plurality of rotatably unfixed different diameter driven chain sprockets coaxially, said driven chain sprockets having a generally conical envelope extending between said first end cover plate and said second end cover plate, said driven shaft rotationally coupled to a bicycle rear wheel;

(d) a plurality of chain drive loops for rotationally coupling said plurality of different diameter drive chain sprockets to said plurality of different diameter driven chain sprockets such that a single chain drive loop rotatably couples a single drive chain sprocket to a single driven chain sprocket that are in alignment; and

(e) a means for rotatably engaging a selected single driven chain sprocket to said driven shaft to establish a selected rotational ratio between said drive shaft and said driven shaft.

[c12] 12. A drive train for a bicycle according to claim 11 wherein said means for rotatably engaging is an axially slidable body in a void within said driven shaft movable to a selected axial position along said driven shaft rotational axis corresponding to engaging said selected single driven chain sprocket, said selected axial position is accomplished by an axial linkage within said void that is adjacent to said body and extends beyond said driven shaft.

[c13] 13. A drive train for a bicycle according to claim 12 wherein said driven shaft has a plurality of apertures between said void and an outside diameter of said driven shaft.

- [c14] 14. A drive train for a bicycle according to claim 13 wherein said plurality of different diameter driven chain sprockets have a plurality of cavities located on an internal diameter of said plurality of different diameter driven chain sprockets such that at least one of said cavities align with at least one of said apertures when there is relative rotational movement between said driven shaft and said plurality of different diameter driven chain sprockets.
- [c15] 15. A drive train for a bicycle according to claim 14 wherein said body further comprises a finger that is biased to insert through an aperture of said driven shaft with said finger being received into a cavity of said selected single driven chain sprocket for engaging said selected single driven chain sprocket to said driven shaft when said aperture and said cavity are in alignment.
- [c16] 16. A drive train for a bicycle according to claim 15 wherein said finger is biased by a spring.
- [c17] 17. A drive train for a bicycle according to claim 15 wherein said body further comprises a plurality of fingers.
- [c18] 18. A drive train for a bicycle according to claim 17 wherein said plurality of fingers are biased by a plurality of springs.
- [c19] 19. A drive train for a bicycle according to claim 12 wherein said axial linkage is a direct acting control cable attached to a handlebar mounted selector on the bicycle wherein movement of said handlebar selector moves said direct acting cable resulting in axial movement of said body within said void.
- [c20] 20. A drive train for a bicycle according to claim 19 wherein said axial linkage further comprises a reverse acting control cable that is operable to move in an opposite direction from said directing acting control cable to axially pull said body axially bidirectionally within said void.